U.S. Department of Veterans Affairs

Public Access Author manuscript

Addict Behav. Author manuscript; available in PMC 2019 August 30.

Published in final edited form as:

Addict Behav. 2018 September ; 84: 144–150. doi:10.1016/j.addbeh.2018.04.007.

Regular past year cannabis use in women veterans and associations with sexual trauma

Kendall C. Browne^{a,b,c,d,*}, Marketa Dolan^c, Tracy L. Simpson^{a,b,c}, John C. Fortney^{b,d}, Keren Lehavot^{b,c,d}

^aCenter of Excellence in Substance Addiction Treatment and Education, VA Puget Sound Health Care, 1660 S. Columbian Way, Seattle, WA 98108, United States

^bDepartment of Psychiatry & Behavioral Sciences, University of Washington, 1959 NE, Pacific, Street Box 356560, Room BB1644, Seattle, WA 98195, United States

^cMental Illness Research, Education, and Clinical Center, VA Puget Sound Health Care System, 1660 S. Columbian Way, Seattle, WA 98108, United States

^dCenter of Innovation for Veteran Centered and Value Driven Care, Health Services Research and Development, VA Puget Sound Health Care System, 1660 S. Columbian Way, Seattle, WA 98108, United States

Abstract

Introduction: This study sought to describe the prevalence of regular past year cannabis use (i.e., at least monthly use) in women veterans, to characterize women veterans reporting this level of use, and to examine the independent contributions of sexual trauma across the lifespan on regular past year cannabis use.

Methods: A national online survey on women veterans' health, with targeted oversampling of lesbian and bi-sexual women, collected data from US armed forces women veterans, 18 or older, living in the US (N = 636).

Results: Eleven percent of women reported regular cannabis use (5% heterosexual women; 21% lesbian/bisexual women). In bivariate analysis, identifying as a sexual and/or racial ethnic minority, younger age, being un-married, reporting lower income, receiving VA services, smoking tobacco, and screening positive for alcohol misuse were positively associated with regular cannabis use. Additionally, a greater percentage of cannabis users reported experiencing childhood

*Corresponding author at: VA Puget Sound Healthcare System, 1660 S. Columbian Way, (MC: S-116-MHC), Seattle, WA 98018, United States. kendall.browne@va.gov (K.C. Browne).

Contributors

Drs. Browne, Lehavot, and Simpson designed the initial study. Drs. Krenke and Fortney provided feedback regarding study design and analytic plan. Dr. Browne conducted literature searches and provided summaries of previous research studies. Drs. Krenke and Browne conducted the statistical analyses. Dr. Browne wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of interest

There have been no conflicts of interest in the conduct or reporting of this research study.

Declarations of interest

None.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.addbeh.2018.04.007>.

and adult sexual trauma and screened positive for posttraumatic stress disorder (PTSD) when compared to peers who did not use any drugs. In a multivariate model, the number of life eras women endorsed experiencing sexual trauma was significantly associated with regular cannabis use even when adjusting for demographic variables and PTSD symptoms.

Conclusions: Among women veterans, regular cannabis use is fairly common among those who are sexual and racial/ethnic minorities, younger, unmarried, receiving VA services, and reporting alcohol or tobacco use, PTSD symptoms, and/or multiple sexual traumas across the lifespan. Screening and assessment may be important to consider in healthcare settings serving this veteran population.

Keywords

Cannabis; Marijuana; Sexual trauma; Veterans; Women

1. Introduction

Women are one of the fastest growing segments of the United States veteran population (National Center for Veterans Analysis and Statistics, 2015). The Department of Veterans Affairs (VA) has identified substance use (i.e., alcohol and drug use) as an important health concern and research priority among this veteran group (Cucciare, Simpson, Hoggatt, et al., 2013; Hoggatt, Jamison, Lehavot, et al., 2015; Institute of Medicine, 2010; Yano, Bastian, Bean-Mayberry, et al., 2011). However, information about women veterans' substance use, particularly cannabis use, one of the most widely used drugs of abuse, remains sparse (Bean-Mayberry, Yano, Washington, et al., 2011; Bonn-Miller, Harris, & Trafton, 2012; Hoggatt et al., 2015; Institute of Medicine, 2010; Substance Abuse and Mental Health Services Administration, 2014; Yano et al., 2011).

National epidemiological data suggest cannabis use has risen among civilian women in the United States over the past decade (e.g., estimated prevalence 2001–2002 = 2.6%; 2012–2013 = 6.9%) (Hasin, Saha, Kerridge, et al., 2015). Cannabis use is associated with a range of concerning outcomes, including acute memory and learning impairment, increased risk for cognitive decline, medical disorders (e.g., chronic bronchitis), mental health symptoms (e.g., exacerbation of psychotic symptoms), psychosocial impairments, other substance use, and onset of cannabis use disorder (CUD) (Secades-Villa, Garcia-Rodríguez, Jin, et al., 2015; Volkow, Baler, Compton, et al., 2014; Volkow, Swanson, Evins, et al., 2016). Female cannabis users rate subjective effects of cannabis associated with risk of abuse (i.e., use has “good” effect) more favorably than male peers and also indicate greater willingness to “take it again” (Cooper & Haney, 2014). Furthermore, in a prospective study, cannabis use was associated with an increased risk of later psychological distress among women, though not in men (Danielsson, Lundin, Allebeck, et al., 2016).

Despite concerning consequences, research estimating cannabis use prevalence in women veterans is limited to a few studies examining mixed-gender samples. Studies utilizing National Survey on Drug Use and Health data found an estimated 3.5% of men and women veterans reported past month cannabis use, with prevalence almost four times higher (11%) among veterans ages 21 to 34 (Golub, Vazan, Bennett, et al., 2013; Wagner, Harris,

Federman, et al., 2007). Given that gender differences in drug use prevalence are consistently identified (Davis & Fattore, 2015), examining prevalence of cannabis use specifically among women veterans and better characterizing women reporting such use remains an important endeavor. Additionally, evaluating cannabis use by sexual orientation may be particularly important as sexual minority women are overrepresented among female veterans and have been found to demonstrate disproportionately high rates of cannabis use (Gates, 2010; Trocki, Drabble, & Midanik, 2009).

There is a growing literature attempting to understand correlates of and risk factors for cannabis use and to identify individuals in need of prevention or intervention efforts. One possible risk factor is history of trauma exposure. Both history of trauma and cumulative trauma exposure across the lifespan were associated with cannabis use in a large national civilian sample (Kevorkian, Bonn-Miller, Belendiuk, et al., 2015). The role of specific types of trauma exposure has also been examined (Werner, McCutcheon, Agrawal, et al., 2016). In a large sample of European American and African American civilian women, sexual trauma was the only trauma type found to increase the hazard for cannabis use initiation, though this relationship was only significant for African American women prior to age 15 (Werner et al., 2016).

Sexual trauma exposure occurring at different points across the lifespan may have varying associations with adult substance use (Booth, Mengeling, Torner, et al., 2011; Hankin, Skinner, Sullivan, et al., 1999; Hughes, McCabe, Wilsnack, et al., 2010; Ullman, Relyea, Peter-Hagene, et al., 2013). For instance, a positive association was detected between lifetime substance use disorder (SUD) status and the number of life eras during which women veterans reported sexual trauma (i.e., childhood, pre-military, in-military and post-military rape) (Booth et al., 2011). Cannabis use, which is more prevalent than SUDs and/or other illicit drug use, was not specifically assessed. It remains unknown whether sexual trauma exposure is a risk factor for cannabis use in women veterans, and because this group has very high rates of sexual trauma (Zinzow, Grubaugh, Monnier, et al., 2007), it is an important relationship to evaluate.

To this end, the present study sought to describe cannabis use prevalence in women veterans completing a national online survey, to characterize women veterans reporting cannabis use, and to explore the independent contributions of sexual trauma occurring across the lifespan on women veterans' cannabis use, including the contributions of childhood sexual abuse; adult sexual assault before, during and after the military; and cumulative sexual trauma exposure (i.e., number of different life eras in which sexual trauma was reported). Because sexual minority women may be at particularly high risk for cannabis use (Trocki et al., 2009), we were also interested in examining prevalence separately across sexual orientation and incorporating this variable in all analyses. In light of prior literature (Kevorkian et al., 2015), we hypothesized greater cumulative sexual trauma exposure would be significantly associated with cannabis use.

2. Method

2.1. Participants and procedures

Data were collected as part of a larger parent study conducted by VA researchers via a web-based survey between February and May 2013. Women age 18 or older, biologically born female and currently identifying as a woman, living in the United States (US), and a veteran of the US armed forces were eligible to voluntarily participate (i.e., no compensation). The parent study was advertised as an anonymous survey about the unique life experiences of women veterans. Advertisements were disseminated via online list serves for women veterans and Facebook. Informed consent was obtained via an information statement. Because the parent study aimed to oversample lesbian and bi-sexual women veterans to understand their unique health needs, ads targeting this group were also used. The research was approved by the VA Puget Sound Health Care System Institutional Review Board.

Veterans with complete data on the variables of interest were included in the present study ($n = 647$). Eleven participants who did not report past year cannabis use but did endorse past year use of other drugs (i.e., cocaine, stimulants, and non-prescribed opiates) were excluded, resulting in a final convenience sample of 636 women veterans. Women who reported alcohol or tobacco use were retained.

2.2. Measures

2.2.1. Demographic characteristics—Demographics included age, sexual orientation, marital status, race/ethnicity, total household income, and receipt of VA services.

2.2.2. Childhood sexual abuse—The Childhood Trauma Questionnaire (CTQ) (Bernstein, Fink, Handelsman, et al., 1994) assessed history of child abuse and neglect. Twenty-five items form five subscales (emotional neglect, physical neglect, emotional abuse, physical abuse, and sexual abuse) scored from 1 (never true) to 5 (always true), with higher scores indicating more abuse/neglect. The 5-item sexual abuse subscale (e.g., “Someone tried to touch me in a sexual way or tried to make me touch them”; $\alpha = .97$) was used in the present study.

2.2.3. Adult sexual trauma—Participants were asked to indicate how many times someone had oral, anal or vaginal sex with them without consent during three time periods: before military service (i.e., between 18th birthday and beginning of military service), during military service, and after military service. Item wording was drawn from the Sexual Experiences Survey (SES) (Koss, Abbey, Campbell, et al., 2007) and has been used in previous research (Lehavot & Simoni, 2011).

2.2.4. Cumulative sexual trauma—A composite variable was created to measure sexual trauma exposure across the lifespan. If a participant endorsed any of the five CTQ sexual abuse items, they were considered to have experienced child-hood sexual abuse (0 = no, 1 = yes). This strategy was also applied to adult sexual assault items. An initial variable was calculated by summing across the four time periods examined (i.e., childhood; before, during, after military). The categories for three and four time periods were combined after

initial descriptive statistics revealed only five women in the main outcome group (i.e., cannabis use) endorsed four trauma periods. The final variable ranged from 0 (i.e., no trauma) to 3 (i.e., trauma in 3 time periods).

2.2.5. PTSD—The 17-item Posttraumatic Stress Disorder Checklist – Civilian (PCL-C) (Weathers & Ford, 1996; Wilkins, Lang, & Norman, 2011) assessed PTSD symptoms ($\alpha = 0.97$). Items are summed for a total score ranging from 17 to 85 with higher scores indicating greater PTSD symptom severity.

2.2.6. Cannabis and other substance use—Participants were asked, “In the past year, how often do you use the following...?”: a) cannabis, b) cocaine, c) stimulants, and d) non-pre-scribed opiates. Responses included: not at all, once a month, 2–3 times per month, once a week, 2–3 times per week, 4–5 times per week, every day. Thus, a positive endorsement of cannabis use reflected at least monthly use in the past year and is referred to in the present study as “regular past year cannabis use”. The following question assessed tobacco use, “Do you now smoke cigarettes every day, some days, or not at all?”. The 10-item Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aasland, Babor, et al., 1993) assessed past 12 month alcohol use, with a score ≥ 8 indicative of alcohol misuse.

2.3. Analyses

Descriptive statistics estimated prevalence of regular cannabis use in the past year (i.e., at least monthly use versus no use) in the full sample as well as separately for heterosexual and lesbian/bisexual women veterans. As is often the case with substance use variables, the cannabis variable was highly skewed, with the majority of participants reporting no use. Given this non-normality and the nominal item responses, the cannabis variable was dichotomized to reflect presence/absence of regular use in the past year in all bivariate and regression analyses. Use of other drugs, including tobacco, were also coded dichotomously and examined for descriptive purposes. Tests of the bi-variate relationships between cannabis use and factors previously shown to be associated with drug use were conducted to characterize women veterans reporting regular past year cannabis use in comparison to women veterans who did not report any past year drug use exclusive of alcohol and tobacco (Bonn-Miller et al., 2012; Booth et al., 2011; Davis, Bush, Kivlahan, et al., 2003; Hankin et al., 1999; Hasin et al., 2015; Hughes, McCabe, et al., 2010; Kelley, Brancu, Robbins, et al., 2015; Kevorkian et al., 2015). These factors included: demographic variables, tobacco and alcohol use, childhood sexual abuse and adult assault variables, the cumulative sexual trauma variable, and PTSD symptoms. Independent sample *t*-tests for continuous normally-distributed variables, chi-square tests of independence for categorical count variables, and an independent samples Mann-Whitney *U* test for the non-parametric cumulative sexual trauma variable were used.

A hierarchical logistic regression was used to examine the independent contributions of sexual trauma occurring across the lifespan on women veterans' regular past year cannabis use. Demographic variables were entered in Step 1 and childhood, adult, and cumulative sexual trauma variables were entered in Steps 2–4 in a sequential fashion. As PTSD symptoms have also been associated with cannabis use and CUD (Kevorkian et al., 2015),

PTSD symptom severity was entered in Step 5 to determine if relationships identified in prior steps remain significant when accounting for these symptoms.

A sensitivity analysis was conducted to examine the impact of multicollinearity among sexual trauma variables. Correlations among the single time period childhood and adult sexual trauma variables and the cumulative sexual trauma variable were examined. An additional hierarchical regression model was specified that included only the cumulative sexual trauma variable without the childhood sexual abuse and adult sexual assault variables. The results for this model (Supplemental Table 1) and from a model including only childhood and adult sexual trauma variables (Table 3, Step 3) did not differ from the full model (Table 3, Step 5). As a result, the full model with all sexual trauma variables was retained and is presented here. All analyses were conducted using SPSS v19.

3. Results

3.1. Sample characteristics

Table 1 provides sample descriptive information.

3.2. Regular past year Cannabis use prevalence

In the full sample, seventy-one (11%) women reported regular past year cannabis use, with 25 women (4%) endorsing use once a month, 16 (2%) endorsing use multiple times a month, 18 (3%) endorsing use multiple times a week, and 12 (2%) endorsing daily use. Of women identifying as heterosexual in the sample, twenty (5%) reported regular cannabis use in the past year. Of women identifying as lesbian/bisexual in the sample, 51 (21%) reported regular cannabis use in the past year use (Table 1).

3.3. Characterizing women veterans reporting regular past year Cannabis use

Demographic variables that were significantly associated with regular past year cannabis included identifying as a lesbian or bisexual, identifying as a racial/ethnic minority, younger age, being unmarried, earning lower income, and receiving VA services (Table 1). Identifying as a current smoker and screening positive for alcohol misuse were also positively associated with regular past year cannabis use. Of the women veterans reporting regular past year cannabis use, eleven (15%) also reported using at least one other drug (cocaine, stimulants, or non-prescribed opiates; not included in Table 1).

Additionally, a greater percentage of cannabis users, compared to those who endorsed no past year drug use, reported having experienced childhood sexual abuse and adult sexual assault before and during, but not after, military service. Cumulative sexual trauma was also significantly associated with regular past year cannabis use, such that a greater percentage of cannabis users endorsed experiencing sexual trauma during three or more time periods compared to those who reported no past year drug use. Finally, a greater percentage of cannabis users screened positive for PTSD when compared to peers who did not use any drugs.

3.4. Examining independent contributions of sexual trauma on regular past year Cannabis use

Table 2 provides correlations among variables included in the hierarchical logistic regression model. In this model (Table 3), child-hood sexual abuse was not associated with regular past year cannabis use when adjusting for demographic factors (Step 2). Similarly, adult sexual assault variables before, during, and after the military were not significantly associated with regular past year cannabis use when included in the model (Step 3). Cumulative sexual trauma exposure, however, was significantly associated with cannabis use when entered in the next step (Step 4). Specifically, compared to women who reported no sexual trauma, women who endorsed three or more periods of sexual trauma had increased odds of regular past year cannabis use. This association remained significant when adjusting for current PTSD symptoms, which was found to be a significant independent risk factor for cannabis use (Step 5). Younger age and sexual minority status also remained significant correlates in the final model.

4. Discussion

To our knowledge this is the first study to describe cannabis use prevalence specifically among women veterans, to characterize women veterans reporting such use, and to explore the independent contributions of sexual trauma on cannabis use. Overall prevalence of regular past year cannabis use (11%) was higher than past year cannabis use rates detected in civilian women (i.e., 6.4–6.9%) but slightly lower than reported past year prevalence among women active duty military personnel (13.4%) (Hasin et al., 2015; Ko, Farr, Tong, et al., 2015; Stahlman, Javanbakht, Cochran, et al., 2015). When examined by sexual orientation, prevalence of regular past year cannabis use was similar to past year prevalence rates previously reported in hetero-sexual (e.g., 5.0%–6.9%) and lesbian/bisexual (e.g., 5.2–37.8%) civilian women (Hasin et al., 2015; Hughes, Szalacha, & McNair, 2010; Trocki et al., 2009). The high prevalence among sexual minority women veterans in the current sample (21%) is especially noteworthy and suggests a need to examine unique factors, such as minority stress, that may affect their cannabis use. Furthermore, it is important to note that past year cannabis use was defined as at least monthly use in the present study, a higher threshold than is often used in studies of past year cannabis use prevalence where “any use” is considered indicative of past year use.

Consistent with demographic patterns detected in previous veteran and civilian research, we found a greater proportion of cannabis users were sexual minority women, racial/ethnic minorities, younger, unmarried, and women reporting lower income (Bonn-Miller et al., 2012; Hasin et al., 2015; Hughes, Szalacha, & McNair, 2010; Ko et al., 2015; Substance Abuse Mental Health Services Administration, 2016; Trocki, Drabble, & Midanik, 2005). Our findings also suggest women veterans endorsing regular cannabis use may use or misuse other substances at higher rates than peers who do not use cannabis (Secades-Villa et al., 2015). Future research examining the impact of cannabis use on certain subgroups may be needed, including mediators or moderators that explain use and consequences among vulnerable populations.

Despite significant bivariate associations, sexual traumas occurring at specific periods during the lifespan (i.e., childhood sexual abuse and adult sexual assault variables) were not associated with regular past year cannabis use when adjusting for demographic variables. Cumulative sexual trauma exposure, however, was significantly associated with regular past year cannabis use. Compared with those endorsing no sexual trauma, individuals endorsing three or more periods of sexual trauma exposure had six times the odds of reporting cannabis use. A growing number of studies suggest that cumulative trauma exposure may play an important role in increasing the risk of adult substance use and misuse (Booth et al., 2011; Kelley et al., 2015; Khoury, Tang, Bradley, et al., 2010). For instance, Booth and colleagues (Booth et al., 2011) found cumulative periods of rape exposure were significantly associated with SUD, such that the odds of having a SUD increased from 1.6 to 6.7 across the cumulative variable (reference group = no history of rape; range 0–4), which is remarkably similar to the pattern seen in the present sample. Results identifying similar patterns related specifically to cannabis use are beginning to emerge in civilian samples (Kevorkian et al., 2015), and such findings are further supported by results of the present women veteran-focused study.

This study has several important clinical implications. Given the rates of cannabis use detected, cannabis use screening and assessment practices may be important to consider in a variety of health services settings serving women veterans, particularly as cannabis becomes more widely available and legal consequences are removed. Knowledge of a woman veteran's use for recreational or medicinal purposes may impact the treatment plan for physical and/or mental health conditions being treated by a provider. Furthermore, knowledge of a woman veteran's use for medicinal reasons provides an opportunity to discuss the risks associated with cannabis use and explore alternative treatments, including those that may involve less risk. For instance, such conversations would be important if a women veteran is pregnant or thinking of becoming pregnant and reporting ongoing cannabis use (Gunn, Rosales, Center, et al., 2016). Additionally, providers working with women veterans who use cannabis should also be attentive to individual reasons for use among their patients. The fact that cumulative trauma exposure and PTSD symptom severity were associated with cannabis suggests that self-medication may be a factor, as has been demonstrated in the larger substance use literature (Simpson, Stappenbeck, Luterek, et al., 2014). If a women veteran uses cannabis to manage symptoms following multiple trauma exposures across her lifetime, addressing this pattern of use within the context of treatment—and in a gender-sensitive manner that acknowledges women's heightened risk for sexual trauma specifically (Turchik & Wilson, 2010)—may be useful. Additionally, if a veteran's cannabis use contributes to avoidance behaviors targeted in frontline evidence-based interventions for PTSD (e.g., Prolonged Exposure Therapy), it could impede treatment progress. Discussing her use and potentially establishing goals to reduce and/or limit use during the course of treatment may be indicated (e.g., eliminating use immediately before or after session and while doing homework).

Noteworthy limitations also exist. We evaluated prevalence and correlates of at least monthly cannabis use in the past year. As noted above, this definition limits comparison to previous research utilizing different definitions of past year use. Moreover, cannabis use response options did not include a category for women who used cannabis more than once but less

than monthly in the past year, which could have resulted in the misclassification of these women. We were also unable to examine indicators of misuse or the presence of CUD as such data was not available. The use of a dichotomous cannabis use outcome variable, while appropriate in the context of the current study, limits the ability to examine the relationship between sexual trauma and varying frequencies of cannabis use. The present study utilized retrospective cross-sectional data. Thus, it was not possible to ascertain timing of trauma exposure as it pertains to the onset of cannabis use. It is possible that cannabis use pre-dated endorsed sexual trauma. This is also not a population-based sample as recruitment and data collection took place over the Internet, limiting the generalizability of our findings. Additionally, all measures were based on self-report, which are subject to recall bias or respondent misunderstanding. Finally, our logistic regression results may be affected by moderate collinearity among the sexual trauma variables (Pearson r coefficients = 0.60). Nonetheless, as noted, results did not differ in our sensitivity analysis in which the cumulative sexual trauma variable was examined in a separate model (see Methods).

Due to the relatively small number of cannabis users in the present study, replication of findings with larger samples is needed. Future research should consider utilizing a continuous cannabis use outcome variable as well as emphasizing cannabis use trajectories and differential risk factors for use versus misuse. For example, a recent study found that while trauma exposure was associated with cannabis use, PTSD symptom severity (but not trauma exposure) was associated with CUD (Kevorkian et al., 2015). PTSD was a significant bivariate correlate of cannabis use in the present study and remained significant when entered into the full multivariate model, suggesting further examination of the role that PTSD symptoms may play in cannabis use is warranted. Additionally, exploring the degree to which experiences of discrimination, minority stress, and coping motives are associated with cannabis use are important future avenues for understanding and ultimately addressing cannabis use among women veterans, particularly in those who are sexual minorities and/or of younger age. Other types of trauma exposure (e.g., physical assault, combat) may also be important to consider (Werner et al., 2016). Taken together, such information could subsequently guide assessment, psychoeducation, and treatment efforts.

5. Conclusions

Results of the present study suggest cannabis use may be as prevalent among women veterans as it is among their civilian counterparts. As cannabis use becomes more widely available, it will be important to identify those most at risk for use and misuse as well as to understand the context of their use. Our findings indicate that particular subgroups of women veterans may be more likely to engage in regular cannabis use: sexual minority women, racial/ethnic minority women, younger women, women endorsing use of other substances (e.g., alcohol misuse, tobacco), women who have experienced sexual trauma across multiple life eras, and women who screen positive for PTSD. Screening and assessments that identify cannabis users and those who may be having problems associated with cannabis use may be important tools to consider in a variety of health settings serving this growing veteran population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

This work was supported by resources from the US Department of Veterans Affairs Office of Academic Affiliations, Advanced Fellowship Program in Mental Illness Research and Treatment; the Denver-Seattle VA Health Services Research & Development (HSR&D) Center of Innovation at VA Puget Sound Health Care System; and the Center of Excellence in Substance Addiction Treatment and Education (CESATE) at the VA Puget Sound Health Care System. Dr. Lehavot was supported by a VA CSR&D Career Development Award (1HK2CX000867). There have been no conflicts of interest in the conduct or reporting of this research study. The views expressed in this article are those of the authors and do not represent the views of the Department of Veterans Affairs or the United States government.

References

- Bean-Mayberry B, Yano EM, Washington DL, et al. (2011). Systematic review of women veterans' health: Update on successes and gaps. *Women's Health Issues*, 21 (4), S84–S97. <http://dx.doi.org/10.1016/j.whi.2011.04.022>. [PubMed: 21724149]
- Bernstein DP, Fink L, Handelsman L, et al. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *The American Journal of Psychiatry*, 151(8), 1132. [PubMed: 8037246]
- Bonn-Miller MO, Harris AH, & Trafton JA (2012). Prevalence of cannabis use disorder diagnoses among veterans in 2002, 2008, and 2009. *Psychological Services*, 9(4), 404–416. 10.1037/a0027622. [PubMed: 22564034]
- Booth BM, Mengeling M, Torner J, et al. (2011). Rape, sex partnership, and sub-stance use consequences in women veterans. *Journal of Traumatic Stress*, 24(3), 287–294. 10.1002/jts.20643. [PubMed: 21567476]
- Cooper ZD, & Haney M (2014). Investigation of sex-dependent effects of cannabis in daily cannabis smokers. *Drug and Alcohol Dependence*, 136, 85–91. 10.1016/j.drugalcdep.2013.12.013. [PubMed: 24440051]
- Cucciare MA, Simpson T, Hoggatt KJ, et al. (2013). Substance use among women veterans: Epidemiology to evidence-based treatment. *Journal of Addictive Diseases*, 32(2), 119–139. 10.1080/10550887.2013.795465. [PubMed: 23815420]
- Danielsson A-K, Lundin A, Allebeck P, et al. (2016). Cannabis use and psychological distress: An 8-year prospective population-based study among Swedish men and women. *Addictive Behaviors*, 59, 18–23. 10.1016/j.addbeh.2016.03.005. [PubMed: 27010850]
- Davis C, & Fattore L (2015). Gender differences in cannabis addiction and dependence Cannabinoid modulation of emotion, memory, and motivation (pp. 283–325). Springer http://link.springer.com/chapter/10.1007/978-1-4939-2294-9_12.
- Davis TM, Bush KR, Kivlahan DR, et al. Screening for substance abuse and psychiatric disorders among women patients in a VA Health Care System. *Psychiatric Services*. 2003 <http://ps.psychiatryonline.org/doi/pdf/10.1176/appi.ps.54.2.214>. Accessed January 17, 2017. doi:10.1176/appi.ps.54.2.214.
- Gates G (2010). Lesbian, gay, and bisexual men and women in the US military: Updated estimates. The Williams Institute <https://escholarship.org/uc/item/0gn4t6t3>, Accessed date: 1 April 2017.
- Golub A, Vazan P, Bennett AS, et al. (2013). Unmet need for treatment of substance use disorders and serious psychological distress among veterans: a nationwide analysis using the NSDUH. *Military Medicine*, 178(1), 107–114. 10.7205/MILMED-D-12-00131.
- Gunn JKL, Rosales CB, Center KE, et al. (2016). Prenatal exposure to cannabis and maternal and child health outcomes: A systematic review and meta-analysis. *BMJ Open*, 6(4), e009986. 10.1136/bmjopen-2015-009986.
- Hankin CS, Skinner KM, Sullivan LM, et al. (1999). Prevalence of depressive and alcohol abuse symptoms among women VA outpatients who report experiencing sexual assault while in the

- military. *Journal of Traumatic Stress*, 12(4), 601–612. 10.1023/A:1024760900213. [PubMed: 10646179]
- Hasin DS, Saha TD, Kerridge BT, et al. (2015). Prevalence of marijuana use disorders in the United States between 2001–2002 and 2012–2013. *JAMA Psychiatry*, 72(12), 1235–1242. 10.1001/jamapsychiatry.2015.1858. [PubMed: 26502112]
- Hoggatt KJ, Jamison AL, Lehavot K, et al. (2015). Alcohol and drug misuse, abuse, and dependence in women veterans. *Epidemiologic Reviews*, 37, 23. 10.1093/epirev/mxu010. [PubMed: 25608962]
- Hughes T, McCabe SE, Wilsnack SC, et al. (2010). Victimization and substance use disorders in a national sample of heterosexual and sexual minority women and men. *Addiction*, 105(12), 2130–2140. 10.1111/j.1360-0443.2010.03088.x. [PubMed: 20840174]
- Hughes T, Szalacha LA, & McNair R (2010). Substance abuse and mental health disparities: Comparisons across sexual identity groups in a national sample of young Australian women. *Social Science & Medicine*, 71(4), 824–831. 10.1016/j.socscimed.2010.05.009. [PubMed: 20579794]
- Institute of Medicine (2010). *Returning home from Iraq and Afghanistan: Preliminary assessment of readjustment needs of veterans, service members, and their families*. Washington, DC: The National Academies Press.
- Kelley ML, Brancu M, Robbins AT, et al. (2015). Drug use and childhood-, military- and post-military trauma exposure among women and men veterans. *Drug and Alcohol Dependence*, 152, 201–208. 10.1016/j.drugalcdep.2015.03.038. [PubMed: 25957156]
- Keckvorkian S, Bonn-Miller MO, Belendiuk K, et al. (2015). Associations among trauma, posttraumatic stress disorder, cannabis use, and cannabis use disorder in a nationally representative epidemiologic sample. *Psychology of Addictive Behaviors*, 29(3), 633. 10.1037/adb0000110. [PubMed: 26415060]
- Khoury L, Tang YL, Bradley B, et al. (2010). Substance use, childhood traumatic experience, and posttraumatic stress disorder in an urban civilian population. *Depression and Anxiety*, 27(12), 1077–1086. 10.1002/da.20751. [PubMed: 21049532]
- Ko JY, Farr SL, Tong VT, et al. (2015). Prevalence and patterns of marijuana use among pregnant and nonpregnant women of reproductive age. *American Journal of Obstetrics and Gynecology*, 213(2), (201–e1). 10.1016/j.ajog.2015.03.021. [PubMed: 25772211]
- Koss MP, Abbey A, Campbell R, et al. (2007). Revising the SES: A collaborative process to improve assessment of sexual aggression and victimization. *Psychology of Women Quarterly*, 31(4), 357–370. 10.1111/j.1471-6402.2007.00385.x.
- Lehavot K, & Simoni JM (2011). The impact of minority stress on mental health and substance use among sexual minority women. *Journal of Consulting and Clinical Psychology*, 79(2), 159. 10.1037/a0022839. [PubMed: 21341888]
- National Center for Veterans Analysis and Statistics (2015). Table 1L: VETPOP2014 living veterans by age group, gender, 2013–2043 [Data file]. http://www.va.gov/vetdata/Veteran_Population.asp.
- Saunders JB, Aasland OG, Babor TF, et al. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction*, 88(6), 791–804. 10.1111/j.1360-0443.1993.tb02093.x. [PubMed: 8329970]
- Secades-Villa R, Garcia-Rodríguez O, Jin CJ, et al. (2015). Probability and predictors of the cannabis gateway effect: A national study. *The International Journal on Drug Policy*, 26(2), 135–142. 10.1016/j.drugpo.2014.07.011. [PubMed: 25168081]
- Simpson TL, Stappenbeck CA, Luterek JA, et al. (2014). Drinking motives moderate daily relationships between PTSD symptoms and alcohol use. *Journal of Abnormal Psychology*, 123(1), 237. 10.1037/a0035193. [PubMed: 24661174]
- Stahlman S, Javanbakht M, Cochran S, et al. (2015). Mental health and substance use factors associated with unwanted sexual contact among US active duty service women. *Journal of Traumatic Stress*, 28(3), 167–173. 10.1002/jts.22009. [PubMed: 25976935]
- Substance Abuse and Mental Health Services Administration (2014). *Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings Substance Abuse and Mental Health Services Administration: Rockville, MD*.

- Substance Abuse Mental Health Services Administration (2016). Results from the 2014 National Survey on Drug Use and Health: Detailed Tables. 2015. <https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2015/NSDUH-DetTabs-2015/NSDUH-DetTabs-2015.pdf> (Accessed 2016).
- Trocki K, Drabble LA, & Midanik LT (2005). Use of heavier drinking contexts among heterosexuals, homosexuals and bisexuals: Results from a National Household Probability Survey. *Journal of Studies on Alcohol*, 66, 105 10.15288/jsa.2005.66.105. [PubMed: 15830910]
- Trocki KF, Drabble LA, & Midanik LT (2009). Tobacco, marijuana, and sensation seeking: Comparisons across gay, lesbian, bisexual, and heterosexual groups. *Psychology of Addictive Behaviors*, 23(4), 620 10.1037/a0017334. [PubMed: 20025368]
- Turchik JA, & Wilson SM (2010). Sexual assault in the US military: A review of the literature and recommendations for the future. *Aggression and Violent Behavior*, 15(4), 267–277. <http://dx.doi.org/10.1016/j.avb.2010.01.005>.
- Ullman SE, Relyea M, Peter-Hagene L, et al. (2013). Trauma histories, substance use coping, PTSD, and problem substance use among sexual assault victims. *Addictive Behaviors*, 38(6), 2219–2223. <http://dx.doi.org/10.1016Zj.addbeh.2013.01.027>. [PubMed: 23501138]
- Volkow ND, Baler RD, Compton WM, et al. (2014). Adverse health effects of marijuana use. *The New England Journal of Medicine*, 370(23), 2219–2227. 10.1056/NEJMr1402309. [PubMed: 24897085]
- Volkow ND, Swanson JM, Evins AE, et al. (2016). Effects of cannabis use on human behavior, including cognition, motivation, and psychosis: A review. *JAMA Psychiatry*, 73(3), 292–297. 10.1001/jamapsychiatry.2015.3278. [PubMed: 26842658]
- Wagner TH, Harris KM, Federman B, et al. (2007). Prevalence of substance use disorders among veterans and comparable nonveterans from the National Survey on Drug Use and Health. *Psychological Services*, 4(3), 149 10.1037/1541-1559.4.3.149.
- Weathers F, & Ford J (1996). Psychometric properties of the PTSD checklist (PCL-C, PCL-S, PCL-M, PCL-PR) In Stamm BH (Ed.). *Measurement of stress, trauma, and adaptation*. Lutherville MD: Sidran Press.
- Werner KB, McCutcheon VV, Agrawal A, et al. (2016). The association of specific traumatic experiences with cannabis initiation and transition to problem use: Differences between African-American and European-American women. *Drug and Alcohol Dependence*, 162, 162–169. 10.1016/j.drugalcdep.2016.03.003. [PubMed: 27012434]
- Wilkins KC, Lang AJ, & Norman SB (2011). Synthesis of the psychometric properties of the PTSD checklist (PCL) military, civilian, and specific versions. *Depression and Anxiety*, 28(7), 596–606. 10.1002/da.20837. [PubMed: 21681864]
- Yano EM, Bastian LA, Bean-Mayberry B, et al. (2011). Using research to transform care for women veterans: Advancing the research agenda and enhancing research-clinical partnerships. *Women's Health Issues*, 21(4), S73–S83. 10.1016/j.whi.2011.04.002. [PubMed: 21724148]
- Zinzow HM, Grubaugh AL, Monnier J, et al. (2007). Trauma among female veterans a critical review. *Trauma, Violence & Abuse*, 8(4), 384–400. 10.1177/1524838007307295.

HIGHLIGHTS

- Overall, 11% of women veterans endorsed at least monthly cannabis use.
- 5% of heterosexual and 21% of lesbian/bisexual women reported at least monthly use.
- Use was associated with minority and marital status, younger age, and lower income.
- Use was associated with tobacco and alcohol use and PTSD symptoms.
- Experiencing sexual trauma across multiple life eras was associated with use.

Table 1

Sample descriptives and bivariate associations with demographic variables, other drug use, sexual assault variables, and PTSD.

Variable	All (N = 636)		Past year cannabis use (N = 71)		No Past year drug use (N = 565)	
	N	%	N	%	N	%
Sexual orientation ^{a, **}						
Heterosexual	393	62	20	28	373	66
Lesbian or bisexual	243	38	51	72	192	34
Race/Ethnicity ^{a, *}						
White	544	86	55	77	489	87
Non-white	92	14	16	23	76	13
Marital status ^{a, *}						
Not married	351	55	49	69	302	53
Married	285	45	22	31	263	47
Household income ^{a, *}						
< 15K–35K	218	34	28	40	190	33
\$36–50K	114	18	20	28	94	17
\$51–70K	99	16	10	14	89	16
> \$71K	205	32	13	18	192	34
VA services ^{a, **}						
Received	446	70	61	86	385	68
Did not receive	189	30	10	14	179	32
Tobacco use ^{a, **}						
Non-smoker	472	74	35	49	437	77
Smoker	158	25	36	51	122	22
Alcohol use ^{a, **}						
AUDIT negative	528	83	38	54	490	87
AUDIT > 8	103	16	31	44	72	13
CSA ^{a, **}						
Yes	315	49	48	68	267	47
No	321	51	23	32	298	53
Before military SA ^{a, **}						
Yes	176	28	32	45	144	25
No	460	72	39	55	421	75
During military SA ^{a, *}						
Yes	255	40	38	54	217	38
No	381	60	33	46	348	62

Variable	All (N = 636)		Past year cannabis use (N = 71)		No Past year drug use (N = 565)	
	N	%	N	%	N	%
After military SA ^a						
Yes	96	15	13	18	83	15
No	540	85	58	82	482	85
Cumulative ST ^{a, **}						
0	197	31	12	17	185	33
1	179	28	16	22	163	29
2	145	23	19	27	126	22
3 +	115	18	24	34	91	16
PCL-C ^{a, **}						
PCL negative	425	67	32	45	393	70
PCL-C > 50	211	33	39	55	172	30
Variable	Mean	SD	Mean	SD	Mean	SD
Age ^{b, **}	49.9	13.8	42.4	12.2	50.8	13.7
AUDIT score ^{b, **}	4.3	5.1	8.5	7.3	3.8	4.6
CTQ CSA scale ^{b, *}	2.0	1.4	2.4	1.5	2.0	1.4
Before military SA ^{b, **}	1.1	2.1	1.8	2.8	0.96	2.0
During military SA ^b	1.4	2.4	1.5	2.3	1.4	2.4
After military SA ^b	0.6	1.8	0.6	1.8	0.6	1.8
PCL-C score ^{b, **}	40.6	20.1	50.9	18.7	39.3	19.9

Note. AUDIT = Alcohol Use Disorder Identification Test. CTQ = Childhood Trauma Questionnaire. CSA = childhood sexual abuse. SA = sexual assault. ST = sexual trauma. Possible range of scores on CTQ SA scale is 1–5. Possible range of scores for before, during, and after military SA is 0–9.

^a Chi-square or Mann-Whitney *U* statistic.

^b T-test statistic.

* *p* < .05.

** *p* < .01.

Table 2

Bivariate correlations among variables in logistic regression model (N=636).

Variable	1	2	3	4	5	6	7	8	9	10	11
1 Age	–										
2 Lesbian or bisexual	–0.117**	–									
3 Not married	0.035	–0.168**	–								
4 Non-white	–0.128**	0.026	–0.011	–							
5 Income	0.220**	–0.165**	0.407**	–0.050	–						
6 CSA	–0.012	0.146**	–0.024	0.083*	–0.085*	–					
7 Before military SA	–0.021	0.103**	–0.051	0.077	–0.112**	0.486**	–				
8 During military SA	–0.033	–0.016	–0.078*	–0.004	–0.059	0.126*	0.247**	–			
9 After military SA	0.014	–0.046	–0.026	0.006	–0.090*	0.167**	0.348**	0.436**	–		
10 Cumulative Sexual	–0.061	0.089*	–0.084*	0.067	–0.121**	0.584**	0.594**	0.514**	0.436**	–	
11 PCL-C	–0.272**	0.116**	–0.101*	0.110**	–0.249**	0.326**	0.294**	0.440**	0.255**	0.452**	–
12 Cannabis Use	–0.193**	0.245**	–0.099*	0.081*	–0.097*	0.102*	0.128**	0.024	0.001	0.161**	0.181**

Note. CSA = childhood sexual abuse. SA = sexual assault. ST = sexual trauma. PCL-C = Posttraumatic Stress Disorder Checklist – Civilian.

*
p < .05.**
p < .01.

Table 3

Logistic regression model with past year cannabis use the as the outcome (N=636).

	Step 1		Step 2		Step 3		Step 4		Step 5	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age	0.96	0.94–0.98**	0.96	0.94–0.98**	0.96	0.94–0.98**	0.96	0.94–0.98**	0.96	0.94–0.98**
Lesbian or bisexual	4.22	2.40–7.41**	4.00	2.26–7.05**	3.98	2.24–7.07**	4.18	2.33–7.50**	4.08	2.27–7.34**
Not married	1.44	0.79–2.64	1.43	0.78–2.62	1.40	0.77–2.56	1.37	0.74–2.53	1.41	0.76–2.63
Non-white	1.53	0.80–2.94	1.46	0.76–2.82	1.44	0.74–2.78	1.46	0.74–2.87	1.41	0.72–2.79
Income (Ref.: < \$15K–35K)										
\$36–50K	1.66	0.85–3.25	1.68	0.86–3.30	1.64	0.83–3.25	1.64	0.82–3.29	1.60	0.79–3.25
\$51–70K	1.28	0.56–2.97	1.30	0.56–3.01	1.25	0.54–2.91	1.28	0.54–3.03	1.40	0.59–3.33
> \$71K	0.97	0.44–2.14	0.99	0.45–2.19	1.03	0.46–2.30	1.08	0.48–2.45	1.24	0.54–2.83
CSA			1.18	0.99–1.40	1.08	0.88–1.32	0.94	0.75–1.19	0.90	0.71–1.14
Before military SA					1.11	0.98–1.26	1.01	0.88–1.17	1.01	0.87–1.16
During military SA					1.02	0.91–1.15	0.94	0.82–1.07	0.89	0.78–1.03
After military SA					0.97	0.82–1.14	0.91	0.76–1.09	0.90	0.75–1.08
Cumulative ST (Ref.: 0)										
1							1.46	0.61–3.45	1.37	0.57–3.29
2							2.28	0.93–6.02	2.26	0.88–5.78
3							6.29	2.00–19.8**	5.70	1.78–18.24**
PCL-C									1.02	1.00–1.04*

Note. SE = standard error. OR = odds ratio. CI = confidence interval. CSA = childhood sexual abuse. SA = sexual assault. ST = sexual trauma. PCL-C = Posttraumatic Stress Disorder Checklist – Civilian.

Ref. = reference group.

*
p < .05.**
p < .01.